RETURN: TO 2-3830
ARVEL ACUFF

M²

INSTRUCTION BOOK

FOR

MODEL MC-406

RF MULTICOUPLER

NEMS CLARKE CO.

919 JESUP BLAIR DRIVE • SILVER SPRING, MARYLAND

A DIVISION OF Vitro CORPORATION OF AMERICA

INSTRUCTION BOOK
FOR
MODEL MC-406
R. F. MULTICOUPLER

NEMS-CLARKE COMPANY
919 Jesup-Blair Drive
Silver Spring, Maryland
A Division of VITRO Corporation of America

Digitized by the Internet Archive
in 2026

https://archive.org/details/manualsplus_12063

WARNING

This equipment employs voltages which are dangerous and may be fatal if contacted by operating personnel. Extreme caution should be exercised while working with this equipment.

TABLE OF CONTENTS

Section		Page
I	INTRODUCTION AND DESCRIPTION	1
	1-1. Purpose of Equipment	1
	1-2. Description of Equipment	1
II	THEORY OF OPERATION	3
	2-1. Model MC-406 Multicoupler, General	3
	2-2. First RF Amplifier	3
	2-3. First RF Plate Load	4
	2-4. Second RF Amplifier	4
	2-5. Second RF Plate Load	4
	2-6. Resistive Outputs to Receiver	4
	2-7. Power Supply	4
III	INSTALLATION	5
	3-1. Introduction	5
	3-2. Siting	5
	3-3. Unpacking	5
	3-4. Electrical Connections	5
IV	OPERATION	6
	4-1. General	6
	4-2. Placing the Equipment in Operation	6
	4-3. Securing the Equipment	6
V	ROUTINE MAINTENANCE	7
	5-1. Preventive Maintenance	7
	5-2. Preventive Maintenance Techniques	7
	5-3. Performing Preventive Maintenance	7
	5-4. Lubrication	8
	5-5. Trouble Shooting	8
	5-6. Model MC-406 Multicoupler, General	9
	5-7. Improperly Operating Multicoupler	9
	5-8. Inoperative Multicoupler	9
VI	CORRECTIVE MAINTENANCE	10
	6-1. General	10
	6-2. Removal of Multicoupler Chassis	10
	6-3. Tube Checking	10
	6-4. Cleaning and Inspecting Chassis Assemblies	10
	6-5. Replacement of Parts	10
	6-6. Replacement of Silicon-Juntion Rectifiers	11

Section Page

6-7. Refinishing 11
6-8. Performance Specifications 11
6-9. Test Equipment Required for Alignment 11
6-10. Model MC-406 Multicoupler, Alignment Procedure 11
6-11. Output Stage 12
6-12. Overall 12
6-13. Input Standing Wave Ratio 12
VII MAINTENANCE PARTS LIST 17

LIST OF ILLUSTRATIONS

Figure Page

1-1. Model MC-406 RF Multicoupler, Front View vi
2-1. Model MC-406 RF Multicoupler, Block Diagram 3
6-1. Output Detector 12
6-2. Model MC-406 RF Multicoupler, Top View of Chassis 13
6-3. Model MC-406 RF Multicoupler, Rear View of Chassis 14
6-4. Model MC-406 RF Multicoupler, Bottom View of Chassis 15
6-5. Model MC-406 RF Multicoupler, Bottom View of Sub-Chassis 16
7-1. Schematic Diagram, Model MC-406 RF Multicoupler 22

LIST OF TABLES

Table No. Page

1-1. Performance Specifications, RF Multicoupler, MC-406 1
1-2. Semi-Conductor and Tube Complement 2
5-1. Preventive Maintenance Schedule 7
5-2. Normal Tube Socket Voltages 8

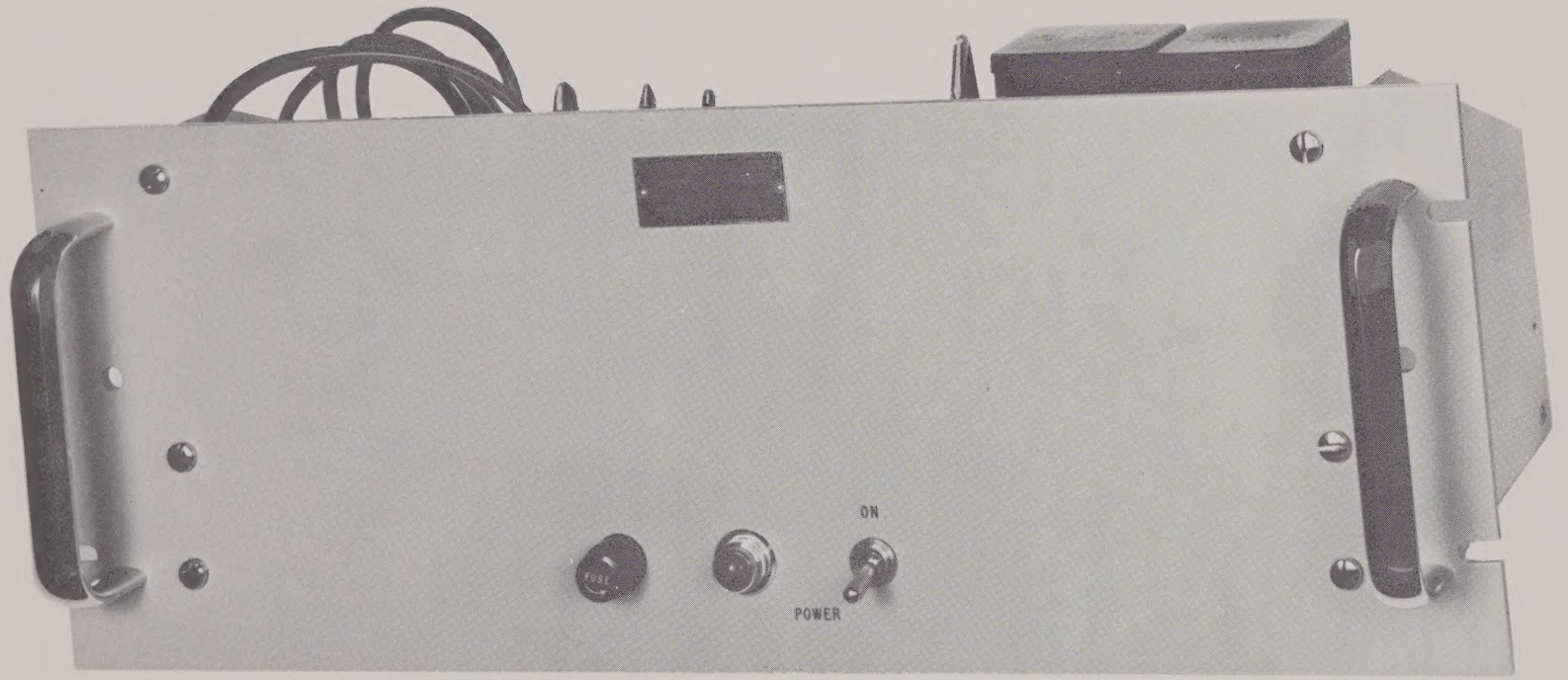


Figure 1-1. Model MC-406 Multicoupler, Front View

SECTION I

INTRODUCTION AND DESCRIPTION

1-1. PURPOSE OF EQUIPMENT.

The Nems-Clarke Company R. F. Multicoupler Model MC-406 is specifically designed for use in a land or shipboard telemetry receiving installation. When the MC-406 is used in conjunction with the Nems-Clarke R. F. Preamplifier, Model PR-203, it receives an amplified and improved R. F. signal (with respect to signal-to-noise ratio) within the assigned telemetry spectrum of 215 to 260 mc. It then distributes this improved signal to as many as eight different telemetry receivers through an eight-output resistive coupling network which maintains a high degree of signal isolation between the individual receivers. The Multicoupler may be used with the Preamplifier, or it may be separated from the Preamplifier while using seventy-five (75) feet of type RG-8/U coaxial cable connected to their respective input and output within a Telemetry Receiving and Recording system.

1-2. DESCRIPTION OF EQUIPMENT.

The electrical components of the R. F. Multicoupler are mounted on and in an aluminum chassis and front panel designed for standard 19 inch relay rack mounting. The assembly is secured to a relay rack, through four slotted holes on the front panel, with appropriate mounting screws. The approximate overall dimensions of the equipment, ready for mounting in the rack are: 19 inches wide by 7 inches high by 11 inches deep. The weight of the complete equipment is approximately 15 pounds. Table 1-1 shows the Performance Specifications and Table 1-2 shows the Semiconductor and Tube Complement.

TABLE 1-1

PERFORMANCE SPECIFICATIONS

Passband	215-260 mc
Uniformity of Response	Within 1.0 db of the mid band response.
Gain	Approximately unity.
Impedance	Designed to operate in a 50 ohm system.
Receiver Outputs	8
Isolation	35 db minimum
Power Source	115 volts, 50 to 400 cycles per second, single phase.
Power Consumption	17 watts

TABLE 1-2

SEMI-CONDUCTOR AND TUBE COMPLEMENT

Symbol	Type	Function
CR-101	1N539	1/4 Bridge Rectifier
CR-102	1N539	1/4 Bridge Rectifier
CR-103	1N539	1/4 Bridge Rectifier
CR-104	1N539	1/4 Bridge Rectifier
V-101	5842/417A	First RF Amplifier
V-102	5842/417A	Second RF Amplifier

SECTION II

THEORY OF OPERATION

2-1. MODEL MC-406 R. F. MULTICOUPLER, GENERAL.

The Model MC-406 R. F. Multicoupler consists of two R. F. Amplifiers that feed an eight-output resistive coupling network that divides the signal in such a way as to provide eight independent receiver outputs. The passband of the Multicoupler is from 215 to 260 mc, and has a uniformity of response in this band within 1. 0 db, of the mid-band response. The gain of the multicoupler is approximately unity. The minimum isolation between receiver outputs is 35 db. The multicoupler operates from a nominal power source of 115 VAC, and will operate efficiently over a power input frequency range of 50 to 400 cycles per second. A block diagram of the unit is shown in figure 2-1.

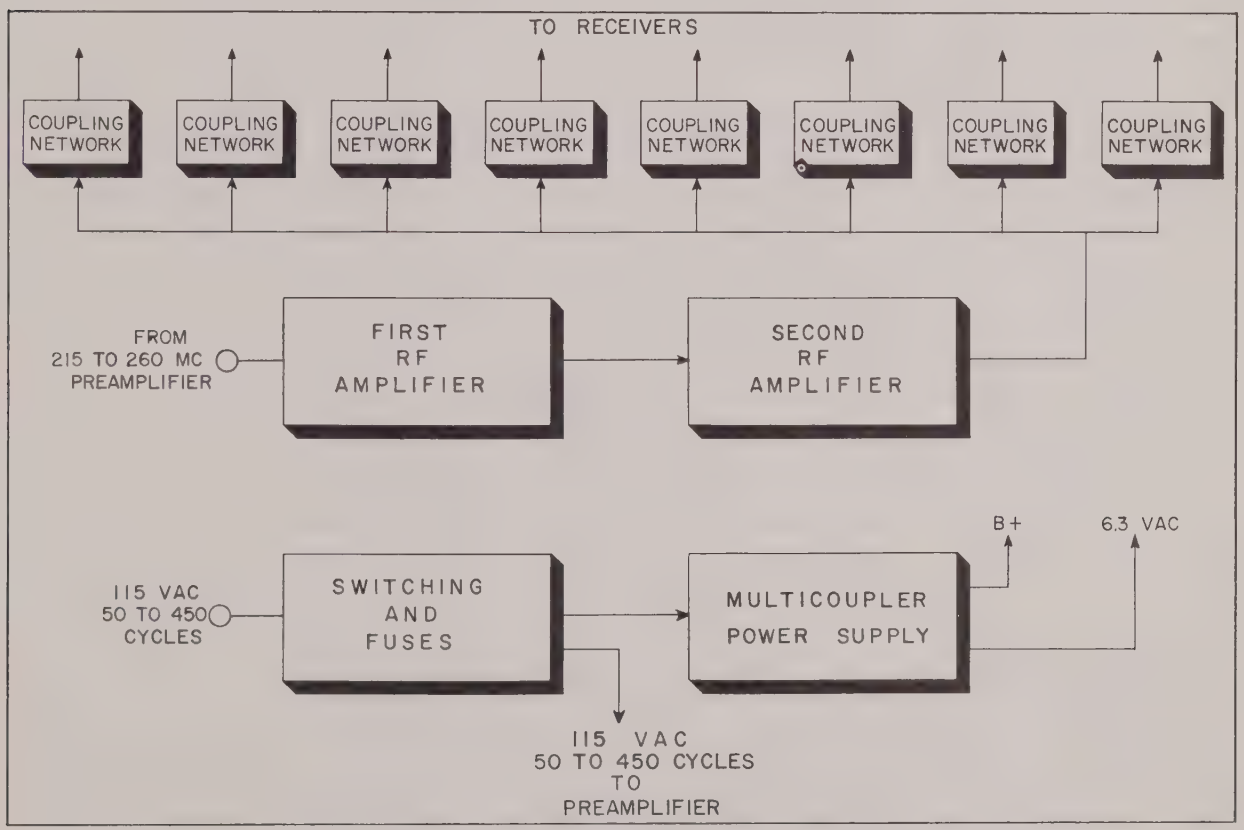


FIG. 2-1. BLOCK DIAGRAM, MODEL MC-406 RF MULTICOUPLER

2-2. FIRST R. F. AMPLIFIER.

The signal from the preamplifier, is applied to the input jack, J-102, on the rear apron of the multicoupler, and is then applied across the variable capacitor, C-101, and through the LC combination of L-101 and C-102 to the cathode of the First R. F. Amplifier, V-101, a type 5842/417A vacuum tube. L-101 consists of a 7/16 inch lead of C-102. Cathode resistor method of obtaining self-bias is used in this amplifier, resistor R-101 developing a bias proportional to the current through itself of approximately 10. 6 volts DC. Cathode resistor bypassing is provided by capacitor, C-103. A negative voltage of approximately 10 volts DC is applied to the negative end of R-101, thus nullifying a portion of the voltage, and reducing the effective bias voltage to approximately 0. 6 volts DC.

2-3. FIRST R. F. PLATE LOAD.

The plate load for the First R. F. Amplifier consists of the self-resonant series inductor, L-103, the coupling inductor, L-104, and a series tuned circuit consisting of L-105 and C-107. This plate load forms a modified "T" network which serves to match the relatively high-impedance of the First R. F. Amplifier plate circuit to the low input impedance of the cathode circuit of the following stage. This network also acts as a bandpass filter to provide the proper interstage response. Capacitors C-105 and C-106, act as plate decoupling capacitors.

2-4. SECOND R. F. AMPLIFIER.

The signal from the modified "T" interstage network is applied to the cathode of the second R. F. amplifier across the inductor, L-106. Cathode resistor method of obtaining self-bias is used in this amplifier, resistor R-103 developing the bias, and capacitor C-108 providing cathode resistor bypassing. Resistor R-103 develops approximately 10. 6 volts DC across itself, 10 volts DC of which is nullified by the application of 10 volts minus from the power supply, leaving an effective bias of approximately 0. 6 volts DC.

2-5. SECOND R. F. PLATE LOAD.

The second R. F. Amplifier plate load consists of series-tuned inductor L-107, coupling inductor L-108 and two parallel capacitors, C-115 and C-111, which serve a double purpose, namely tuning L-107, and preventing the application of B plus to the resistive output coupling networks that feed the various receivers. This network also acts as a bandpass filter to give the overall response the proper shape and to assure sufficient bandwidth to cover the entire telemetry spectrum from 215 to 260 mc.

2-6. RESISTIVE OUTPUTS TO RECEIVERS.

Eight resistive terminations are used to match the output of the second R. F. Amplifier to the coaxial transmission line that feeds the input of the receivers used with the Model MC-406 R. F. Multicoupler. Each consists of four resistors in a modified pi network, which assures a minimum of 35 db isolation between receiver outputs, and at the same time maintains a constant 50 ohm output impedance. Variations in load on the plate circuit of the second R. F. Amplifier are thereby minimized, and a constant output is guaranteed.

2-7. POWER SUPPLY.

115 VAC, 50 to 400 cycles, single phase, alternating current is applied through jack J-101 to the power switches and the primary of the power transformer, T-101. Switch S-101 and pilot lamp assembly DS-101 control and indicate the application of power to the Multicoupler. Fuse F-101 is provided for the protection of the unit to prevent damage in the event of a serious power misfunction. The power transformer, T-101, applies high-voltage AC to the Bridge rectifier, consisting of CR-101 through CR-104. The resulting pulsating DC is filtered by a conventional capacitive input LC filter. The power supply voltage divider network, consisting of R-137 and R-138, supplies approximately 105 volts positive, and minus 10 volts DC.

SECTION III
INSTALLATION

3-1. INTRODUCTION.

The shipping container for the R. F. Multicoupler Model MC-406 consists of an outer and inner corrugated container, with necessary padding to prevent damage to the unit in shipping. When unpacking the unit, great care should be taken that crowbars or other hard, sharp instruments do not come into contact with the equipment, as such contact may damage finished surfaces or external components. After unpacking, the unit should be thoroughly checked for any broken or loose parts. As received, the unit is completely assembled with chassis housing and shock mount frame, and all internal connections are complete.

3-2. SITING.

Since the Model MC-406 Multicoupler is intended for use in conjunction with several receivers, it will usually be convenient to mount it near, or in, the equipment rack containing the receivers with which it is to be associated. The unit may be installed in a blank space in the rack reserved for this purpose by simply mounting it with appropriate screws through the holes provided. All connections may then be made to the multicoupler at the rear of the unit.

3-3. UNPACKING.

The R. F. Multicoupler weighs approximately 23 lbs. packed, and the packed dimensions are approximately 30 x 23 x 19 inches. It should be unpacked as follows:

(a) Carefully open the outer container and remove the inner container.

(b) Open the inner container and lift out the Multicoupler, removing all pads and cushioning material necessary to accomplish this.

(c) Remove and set aside all packing material, carefully checking to see that no components of the equipment are missing.

(d) Check the Multicoupler for possible damage during shipment. Make a visual inspection of the circuit wiring to insure that all electrical connections are intact. All tubes should be checked to see that they make good contact in their sockets.

3-4. ELECTRICAL CONNECTIONS.

All internal electrical connections of the R. F. Multicoupler are complete. There are ten external connectors on the unit: The Power Input connector, J-101, is located on the rear apron of the chassis, and access is provided through the rear of the rack housing. From J-101, connections are made to the main power source of the aircraft. A Signal Input Connector (from the R. F. Preamplifier) is provided on the rear apron of the Multicoupler. Eight Output Connectors (to telemetry receivers) are provided, also on the rear apron. All connectors are labeled with their appropriate functions by adjacent stencilled or engraved titles. (See Figure 6-3). When all connections have been properly made, the Multicoupler is ready for operation.

SECTION IV

OPERATION

4-1. GENERAL.

The Model MC-406 R.F. Multicoupler is intended for use with an R.F. Preamplifier similar to Nems-Clarke Model PR-203. The Model PR-203 Preamplifier is intended for use as a remotely mounted unit and consequently has no switching and fusing provisions of its own. A remote power control panel, containing switches and fuses, is therefore provided with the PR-203 and other similar equipments to be mounted in the rack or adjacent to the operating position. The Model MC-406 Multicoupler consists essentially of two R.F. Amplifiers feeding eight resistive networks used to couple the signal to the inputs of the associated receivers. Since the multicoupler may be used with any type of telemetry receiving system, operation as discussed herein will be confined to a broad relationship with any associated equipment.

4-2. PLACING THE EQUIPMENT IN OPERATION.

(a) Turn the power switch for the Preamplifier, located on the Power Control Panel to the "ON" position. Preamplifier pilot lamp should light.

(b) Place the power switch for the Multicoupler, located on the front panel of the Multicoupler, in the "ON" position. Multicoupler pilot lamp should light.

(c) Thirty seconds after application of power to the Multicoupler, the system is ready to operate.

4-3. SECURING THE EQUIPMENT.

(a) Place Multicoupler power switch in the "OFF" position. Multicoupler pilot lamp should go out.

(b) Place Preamplifier power switch in the "OFF" position. Preamplifier pilot lamp should go out.

(c) The equipment is secured.

SECTION V

ROUTINE MAINTENANCE

5-1. PREVENTIVE MAINTENANCE.

Preventive maintenance is work performed on equipments at regularly scheduled intervals, usually when the equipment is not in use, to assure that the equipment is in good working order so that interruptions and needless breakdowns may be held to a minimum. Preventive maintenance differs from trouble shooting and repair since its object is to prevent certain troubles from developing.

5-2. PREVENTIVE MAINTENANCE TECHNIQUES.

No special tools or materials are supplied or required for preventive maintenance of the Model MC-406 Multicoupler. The common and readily available tools and materials listed below will suffice for the bulk of preventive maintenance work to be performed:

(a) Use #0000 sandpaper to remove corrosion.

(b) Use a clean, dry, lint-free cloth or dry brush for cleaning.

(c) If necessary, except for electrical contacts, moisten the cloth or brush with a Dry Cleaning Solvent; then wipe the parts dry with a clean lint-free cloth.

(d) Clean electrical contacts with a cloth moistened with methyl chloroform, or alcohol, then wipe them dry with a dry cloth.

(e) If available, dry compressed air may be used at a line pressure not exceeding 60 psi to remove dust from the inaccessible places. Be careful, however, of mechanical damage due to the air blast. Preventive maintenance personnel are urged to be on the lookout for loose or otherwise defective connections or solder joints, broken components, or loose or defective hardware.

5-3. PERFORMING PREVENTIVE MAINTENANCE.

The following preventive maintenance operations should be performed at the intervals indicated. Use caution to see that screws and nuts are not tightened carelessly. Fittings tightened beyond their rated capacity may be damaged or broken.

TABLE 5-1.

PREVENTIVE MAINTENANCE SCHEDULE

DAILY
1. Clean exterior surfaces of front panels.
2. Check operation of all pilot lights.
3. Check all operating fuses to see that none show signs of over-heating.
WEEKLY
Caution: Turn off all power to the equipment before performing the following operations. Upon completion, turn on power and check for satisfactory operation.
1. Clean rear and sides of each equipment. Do not disturb any adjustments or controls. Do not clean interior of chassis or wiring beneath the chassis except by carefully blowing and dusting with an air hose.
2. Inspect filter capacitors for leakage of oil or dielectric, for bulging and/or heating.
3. Inspect power and filament transformers for excessive heating.
4. Inspect fuses and fuseholders for corrosion, cracks, and lack of necessary tension to insure good contact.

MONTHLY

Make a visual inspection of the following; tighten and/or clean if necessary.

1. Tube sockets and pins, for loose contacts, dust, and corrosion.

Check vacuum tubes if applicable, and replace as necessary.

2. Filter capacitor terminals for corrosion.
3. Resistors for blistering, discoloration, and other evidences of overheating.
4. Switches for dirt, corrosion, loose contacts, and unsatisfactory operation.
5. Wires, for cracked, cut and frayed insulation.
6. Terminal boards, for dirt and loose connections.
7. Matching screws and nuts for mechanical looseness.
8. Input and output connections for corrosion and looseness.
9. Finish for scratches and bare spots (retouch as necessary).
10. Check major voltages against the Tube Socket Voltage Chart for correctness. (B plus and filaments, etc.)

TABLE 5-2.

NORMAL TUBE SOCKET VOLTAGES

Symbol No.	Type	Pin Numbers								
		1	2	3	4	5	6	7	8	9
V-101	5842/ 417A	102	0	0	0	0	.63	0	0	6 VAC RMS
V-102	5842/ 417A	102	0	0	0	0	.57	0	0	6 VAC RMS

NOTES: 1. B plus at power supply approximately 105 volts DC.

2. B minus at power supply approximately 10 volts DC.

3. All voltages measured with respect to chassis ground with High-Impedance VTVM, such as RCA WV-77A, or equivalent.

4. Power input to unit to be 115 volts, AC, 60 cycles, single phase, alternating current.

5-4. LUBRICATION.

The Model MC-406 Multicoupler does not require lubrication. Lubrication of controls may actually cause harm, or lead to binding or equipment failure.

5-5. TROUBLE SHOOTING.

The trouble shooting and repair work that may be performed by the range maintenance personnel is necessarily limited in scope by tools, test equipment, and replaceable parts issued. Accordingly the trouble shooting described herein is based on the performance of the equipment and the use of the senses or a standard volt-ohmeter in determining such trouble as burned out tubes, broken resistors, etc.

5-6. MODEL MC-406 MULTICOUPLER, GENERAL.

The Model MC-406 Multicoupler has been specifically designed to give a maximum of trouble-free performance with a minimum of routine maintenance. High quality components are used throughout with emphasis being placed on operation well within ratings. All transformers and filter chokes are hermetically sealed to prevent leaking or loss of filler. Electrolytic capacitors have been avoided.

5-7. IMPROPERLY OPERATING MULTICOUPLER.

If the Multicoupler operates improperly, it is usually possible to deduce the cause by the symptoms present. Familiarity of all maintenance personnel with the Theory of Operation as presented in Section 2 of this manual is essential for successful trouble shooting. The schematic diagram in figure 7-1 is also provided for the convenience of the service technician. The first step in performing efficient trouble shooting is to determine as precisely as possible the nature of the defect, such as blown fuse, burnt-out pilot lamp, etc. Very often the nature of the difficulty will point to the section of the unit where the trouble lies. Experience has shown that vacuum tubes are the most frequent cause of breakdowns. Visual inspection may give some clue to the exact location of the difficulty, such as a burned or broken resistor, short or open in the wiring or damaged components, etc. Table 5-2 is a voltage chart of the unit under normal operating conditions with no signal input; comparison of the various voltages in the unit with those shown in the voltage chart may indicate the area of trouble.

5-8. INOPERATIVE MULTICOUPLER.

Maintenance personnel should check for all of the most obvious faults such as burned fuses, broken power lines, and/or broken or disconnected power plugs. Check to make certain that all power switches are in the "ON" position. If lack of operation is caused by the absence of any signal, switch to another receiver output connector on the multicoupler to ascertain if this condition is common to all outputs or to just one. Check power supply voltages and compare with those given in Table 5-2. Check all tubes to be certain none have failed. If no tubes are found to be defective, check for continuity in the input cable. If only one receiver output is inoperative, check for continuity in the associated cable. Further localization of the defect in a similar manner will allow the multicoupler to be repaired and placed in operation with a minimum of delay.

SECTION VI

CORRECTIVE MAINTENANCE

6-1. GENERAL.

The Model MC-406 R. F. Multicoupler has been designed to give a maximum of service with a minimum of maintenance and/or repair. However, this section contains all necessary information for base maintenance of the equipment. The amount of repair that maintenance personnel may perform is limited only by the tools and test equipment available, and by the skill of the repairman.

6-2. REMOVAL OF MULTICOUPLER CHASSIS.

The chassis of the Multicoupler may be removed from the housing by performing the following steps:

(a) Unscrew and disconnect the Amphenol connector, P-101, at the rear of the multicoupler housing, and all R. F. connectors.

(b) Unscrew and remove the four retaining screws in the front panel.

(c) Using a smooth even motion, withdraw the Multicoupler chassis from the rack.

6-3. TUBE CHECKING.

The high frequency tubes used in this equipment are of recent design and consequently only the most modern tube checkers will have provisions for testing them. In the event that such a tube checker is available to maintenance personnel, the tubes should be removed, cleaned, inspected, and tested one at a time, the first tube being reinstalled before proceeding to the next. To remove a miniature tube, first remove the shield, and then using a suitable tube puller, pull the tube straight out of the socket. When replacing a miniature tube, first align the tube pins with the socket holes, and with a smooth motion, force the tube into the socket.

6-4. CLEANING AND INSPECTING CHASSIS ASSEMBLIES.

(a) Cleaning. - Thorough cleaning at regular intervals is necessary to assure optimum uninterrupted performance by preventing corrosion and dirt from damaging parts or causing arc-over or low-resistance leakage between circuit points. Remove loose dirt from the outside areas of the chassis with a soft brush or blower. With a brush or cloth, remove all dirt or grease which adheres to the outer portions of the chassis and panels. Blow out dust from the inner portions of the chassis. Be careful that the air pressure is not great enough to damage parts or disturb wiring.

(b) Inspecting. - After cleaning, make a visual inspection of parts and wiring for corrosion, loose connections, frayed and burned insulation, loose screws, and burned or charred resistors. Carefully inspect tube sockets for broken contacts, capacitors and sealed transformers for signs of leakage of oil or filling compound, terminal boards for broken lugs and signs of burning.

6-5. REPLACEMENT OF PARTS.

Most of the parts in the multicoupler are readily accessible and are easily replaced if found to be defective. Whenever a part requiring the disconnection of many wires, such as a transformer, is to be replaced, carefully mark the disconnected wires with tags or other devices to avoid misconnection. After replacement, all solder joints should be carefully inspected for secure mechanical and electrical connections, and absence of any evidence of cold solder joints.

6-6. REPLACEMENT OF SILICON-JUNCTION RECTIFIERS.

The type silicon-junction rectifier used in the MC-406 R. F. Multicoupler has an extremely long life expectancy and will not normally require replacement. However, if replacement becomes necessary, refer to the following procedure:

(a) Grasp the lead to the rectifier with a pair of needle-nose pliers to prevent excessive heat from reaching the delicate rectifier.

(b) Unsolder and remove the lead from the terminal post.

(c) Repeat the above operations on the other end of the diode. This completes the removal procedure.

(d) Bend the leads of the replacement rectifier around both terminal posts.

(e) Grasping each lead alternately with a pair of needle-nose pliers to prevent excessive heat from reaching the diode, resolder each lead. This completes the replacement.

6-7. REFINISHING.

Badly marred or scratched panels should have the damaged area sanded smooth with fine sandpaper and then be retouched with light-gray enamel.

6-8. PERFORMANCE SPECIFICATIONS.

Pass Band	215-260 mc.
Uniformity of Response	Within 1.0 db of mid band response.
Gain	Approximately unity.
Impedance	Designed to operate in 50 ohm system.
Receiver Outputs	Eight
Isolation	35 db minimum
Power Source	115 volts, 50 to 450 cycles, alternating current.
Power Consumption	17 watts

6-9. TEST EQUIPMENT REQUIRED FOR ALIGNMENT.

The following equipment is required for performing the alignment procedures:

(a) Transition Model SG-132 Sweep Generator, or equivalent.

(b) Output Detector: See Figure 6-1.

(c) Assorted 50 ohm cables and connectors.

(d) Micro-Lab AB-6 6.0 db attenuator.

6-10. MODEL MC-406 MULTICOUPLER ALIGNMENT PROCEDURE.

The Model MC-406 R. F. Multicoupler will normally maintain good alignment for long periods of time and will require little or no realignment. If, however, a tube or component is changed and it becomes obvious that the equipment will require realignment, refer to the following procedure for instructions. The schematic diagram, Figure 7-1, will also prove to be of value in following the alignment procedure.

6-11. OUTPUT STAGE.

(a) Connect the output detector (see figure 6-1) to output connector, J-107.

(b) Unsolder C-107 from the cathode pin of V-102. (pin #6)

(c) Solder the center conductor of a short length of RG-55/U cable through a .001 μf disc ceramic capacitor to pin #6 of V-102.

(d) Adjust the sweep generator for 240 mc center frequency and 20% deviation. Use the maximum output, 110,000 microvolts.

(e) Adjust L-107. C-111, and L-108, for a transitionally coupled response centered at 238 mc. (L-108 is adjusted by a slight bending of the lead connecting L-107 to C-110.)

(f) Remove the signal generator cable from V-102 and reconnect C-107. (L-105 consists of the leads of C-107, and it is important to maintain the same lead length when reconnecting C-107.)

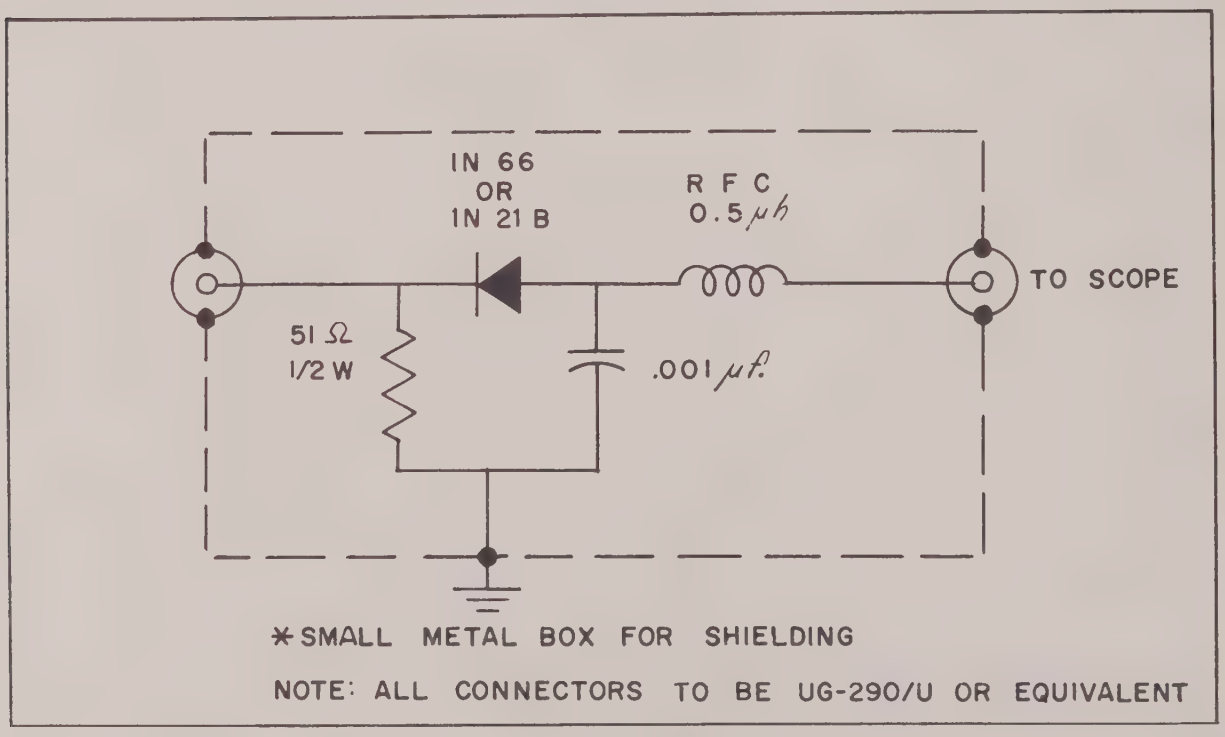


FIG. 6-1. OUTPUT DETECTOR

6-12. OVERALL.

(a) Connect the SG-132 Sweep Generator to the input jack, J-103.

(b) Adjust L-103, L-104, and C-107 for an overall response curve centered at 238 mc with response down approximately .85 db at 215 and 260 mc. The maximum peak response in the pass band referred to the 238 mc level is plus 0.3 db.

6-13. INPUT STANDING WAVE RATIO.

(a) C-101 should be adjusted for minimum SWR on the input transmission line over the frequency range of 215 to 260 mc. This may be done by connecting the sweep generator (using the same calibration as for step 6-11,

(d)) to J-103 through a long length of RG-55/U cable. Approximately 25 to 30 feet of cable is required. The output detector is connected by means of a "T" connector to the signal generator output connector. Before connecting the cable to the Multicoupler, adjust the vertical gain of the SG-132 for a peak-to-peak deflection of 2 divisions. The pattern seen will represent maximum SWR on the open ended cable.

(b) After connecting the cable to the input of the Multicoupler, adjust the capacitor, C-101, for a minimum SWR pattern. The maximum peak-to-peak deflection should be about 0. 2 divisions, corresponding to an SWR of 1. 2.

(c) If the minimum of the SWR display is not centered at 238 mc, adjust the inductor, L-101, by changing the lead length of C-102 as needed. Recheck the response curve after adjusting C-101.

(d) Remove all test equipment, and reassemble the Multicoupler. This completes the alignment procedure.

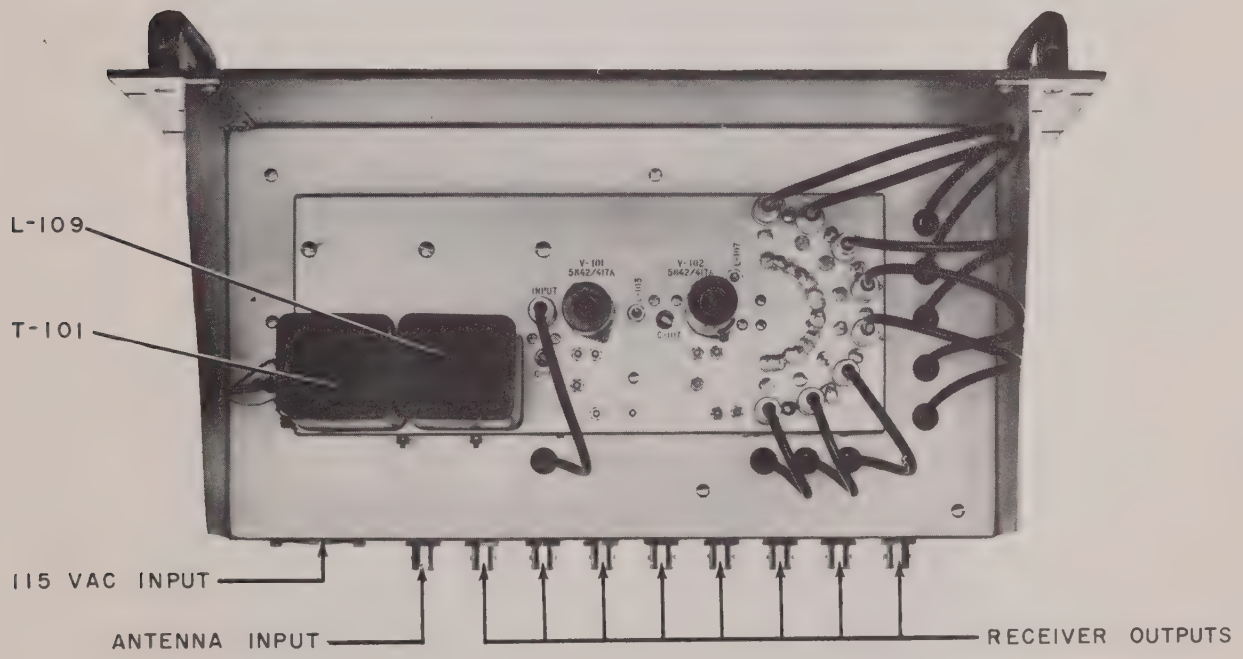


Figure 6-2. Model MC-406 RF Multicoupler, Top View of Chassis

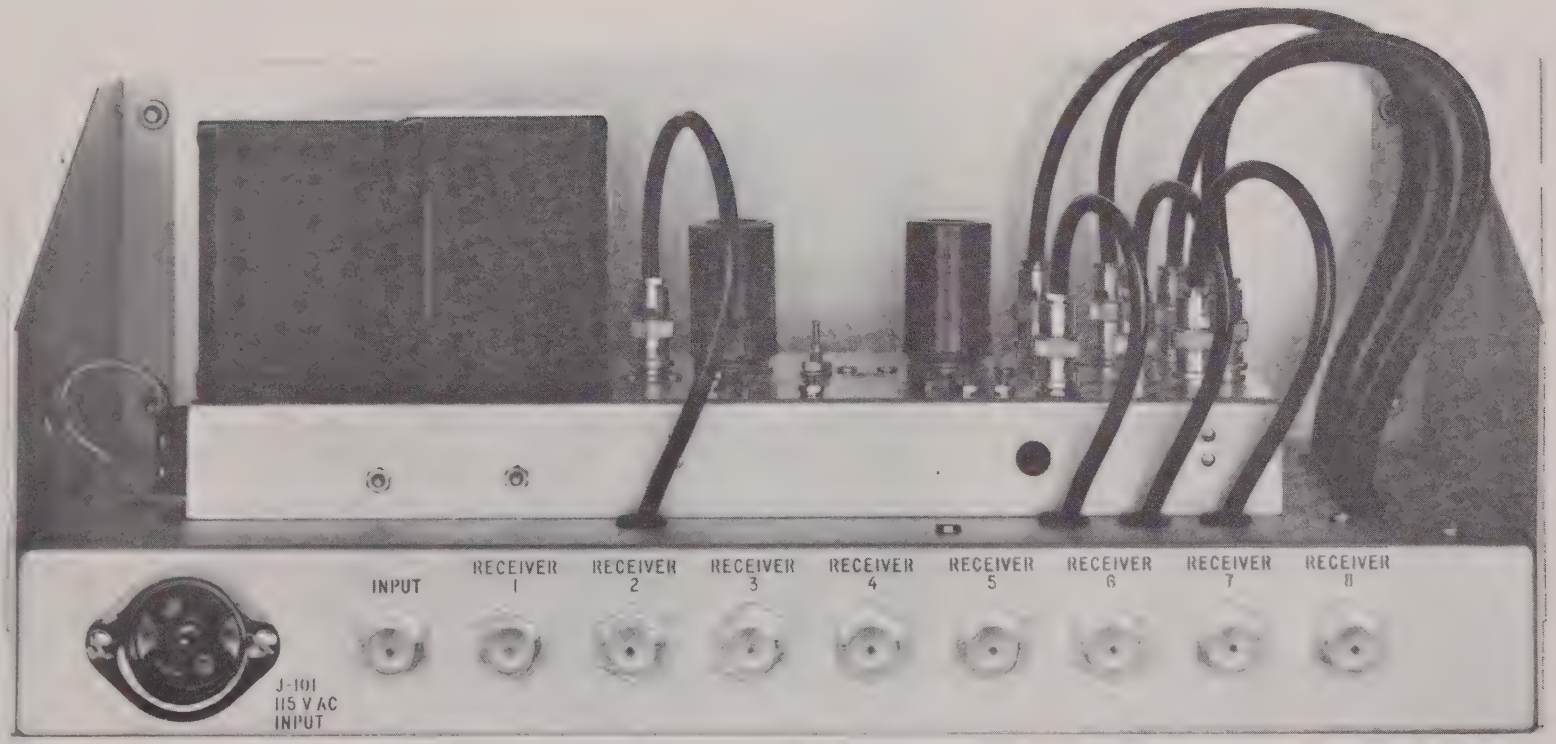


Figure 6-3. Model MC-406 RF Multicoupler, Rear View of Chassis

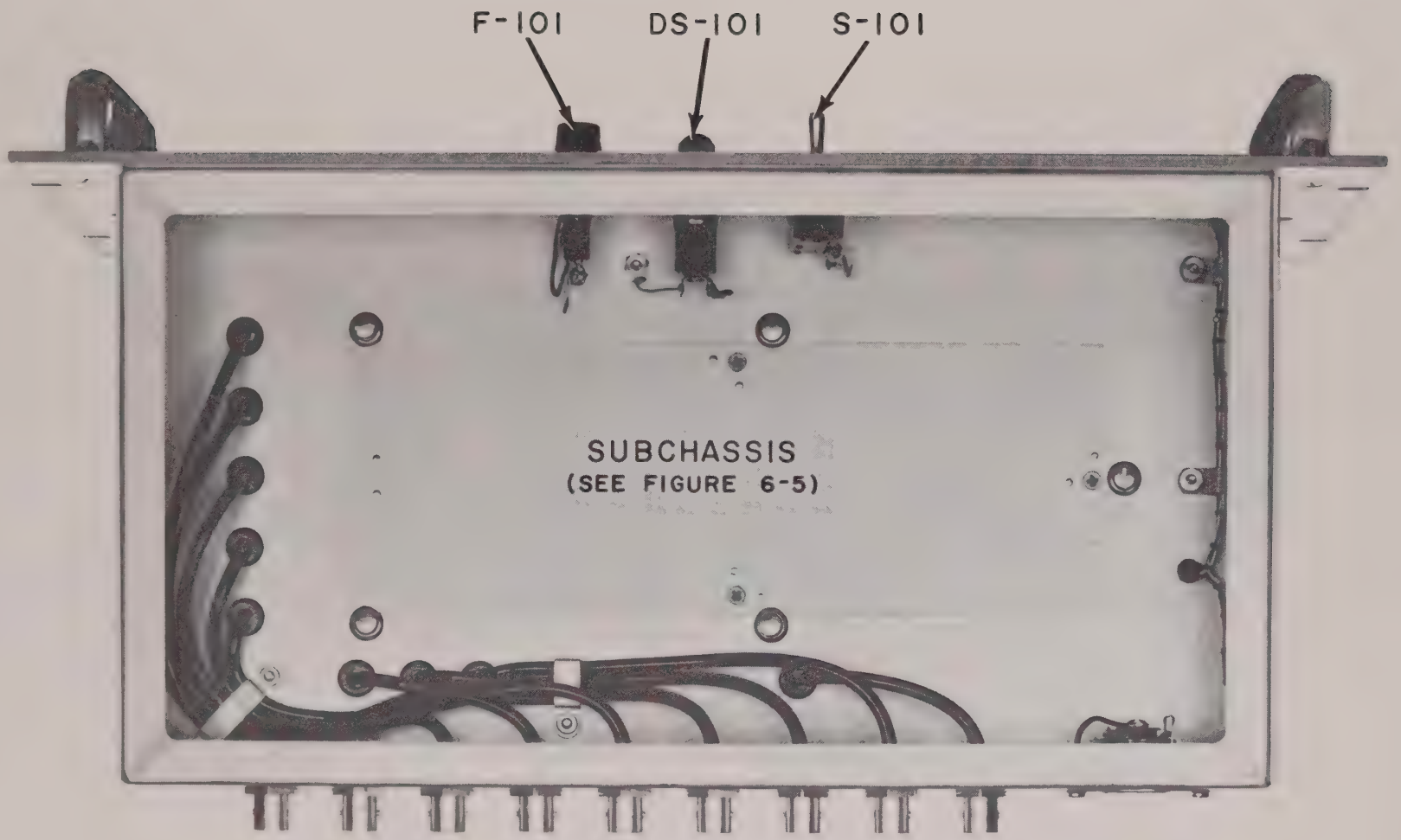


Figure 6-4. Model MC-406 RF Multicoupler, Bottom View of Chassis.

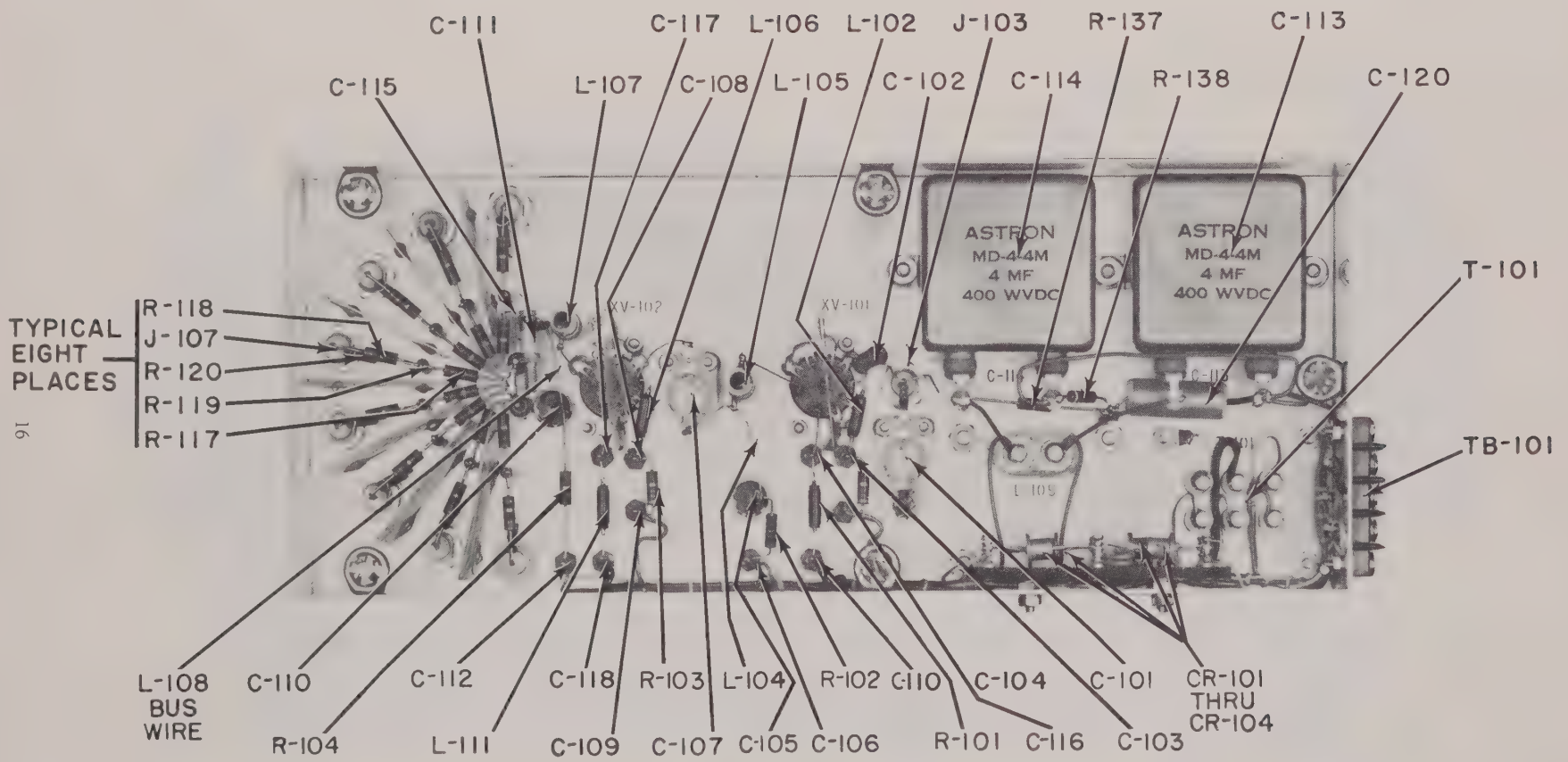


Figure 6-5. Model MC-406 RF Multicoupler, Bottom View of Sub-Chassis

SECTION VII

MAINTENANCE PARTS LIST

When ordering replacement parts from NEMS-CLARKE COMPANY, which are not available from a local supplier, give the equipment name and type number, the reference symbol number, and the description of each item ordered.

Replacement parts which will be supplied against an order may not be exact duplicates of the original parts. However, only minor differences in electrical or mechanical characteristics will be involved; consequently, the operation of the equipment will in no way be impaired.

SECTION VII

MAINTENANCE PARTS LIST

MC-406

REF. SYMBOL NO.	NAME OF PART & DESCRIPTION
C-101	CAPACITOR, VARIABLE, CERAMIC: 4 to 30 μμf, Type TS-2A, 500V, Erie CV11C300
C-102	CAPACITOR, CERAMIC: 470 μμf, ±10%, 500V, Erie style 331
C-103	CAPACITOR, CERAMIC: stand-off, .001 μf, MRC, 500V, Sprague 507C2
C-104	Same as C-103
C-105	CAPACITOR, MICA, BUTTON: stand-off, 1000 μμf, ±10%, 300V, CB21PD102K per MIL-C-109-50A
C-106	Same as C-103
C-107	Same as C-101
C-108	Same as C-103
C-109	Same as C-103
C-110	Same as C-105
C-111	CAPACITOR, VARIABLE, CERAMIC: 1.5 to 12.5 μμf, 500V, CST-50
C-112	Same as C-103
C-113	CAPACITOR, PAPER, BATHTUB: 4 μf, 400V, Astron MD-4-4M
C-114	Same as C-113
C-115	CAPACITOR, CERAMIC: 5.1 μμf ±.5 μμf, 500V, Erie CC20CH5R1D
C-116	Same as C-103
C-117	Same as C-103
C-118	Same as C-103
C-119	Same as C-103
C-120	CAPACITOR, PAPER: .5 μf ±20%, 500V, Aerovox P123ZGP
CR-101	RECTIFIER, silicon Raytheon Mfg. 1N539
CR-102	Same as CR-101
CR-103	Same as CR-101
CR-104	Same as CR-101
DS-101	LAMP: General Electric Type #47
F-101	FUSE: Cartridge, slo-blo, .2 amp, MDL, Bussman
J-101	CONNECTOR, RECEPTACLE, ELECTRICAL: male, Hubbell Twistlock 7486
J-102	CONNECTOR, RECEPTACLE: UG-704/U
J-103	CONNECTOR, RECEPTACLE: UG-1094/U
J-104	Same as J-103
J-105	Same as J-103
J-106	Same as J-103

SECTION VII

MAINTENANCE PARTS LIST

MC-406

REF. SYMBOL NO.	NAME OF PART & DESCRIPTION
J-107	Same as J-103
J-108	Same as J-103
J-109	Same as J-103
J-110	Same as J-103
J-111	Same as J-103
J-112	Same as J-102
J-113	Same as J-102
J-114	Same as J-102
J-115	Same as J-102
J-116	Same as J-102
J-117	Same as J-102
J-118	Same as J-102
J-119	Same as J-102
L-101	INDUCTANCE: Wire lead of C-102
L-102	COIL, per NEMS-CLARKE DWG. #AA-17,422
L-103	COIL, WINDING: per NEMS-CLARKE DWG. #AA-19,887-1
L-104	INDUCTANCE: formed from #22 Buss Wire
L-105	Same as L-104
L-106	Same as L-102
L-107	COIL, WINDING: per NEMS-CLARKE DWG. #AA-19,887-2.
L-108	Same as L-104
L-109	CHOKE: 18 hy, 55 ma per NEMS-CLARKE DWG. #AB-17,400
L-110	Same as L-102
L-111	Same as L-102
P-101	CONNECTOR: electrical plug, Hubbell Twistlock 7484
P-102	CONNECTOR: plug, UG-709A/U
P-103	CONNECTOR: plug, UG-88/U
P-104	Same as P-103
P-105	Same as P-103
P-106	Same as P-103
P-107	Same as P-103
P-108	Same as P-103
P-109	Same as P-103

SECTION VII

MAINTENANCE PARTS LIST

MC-406

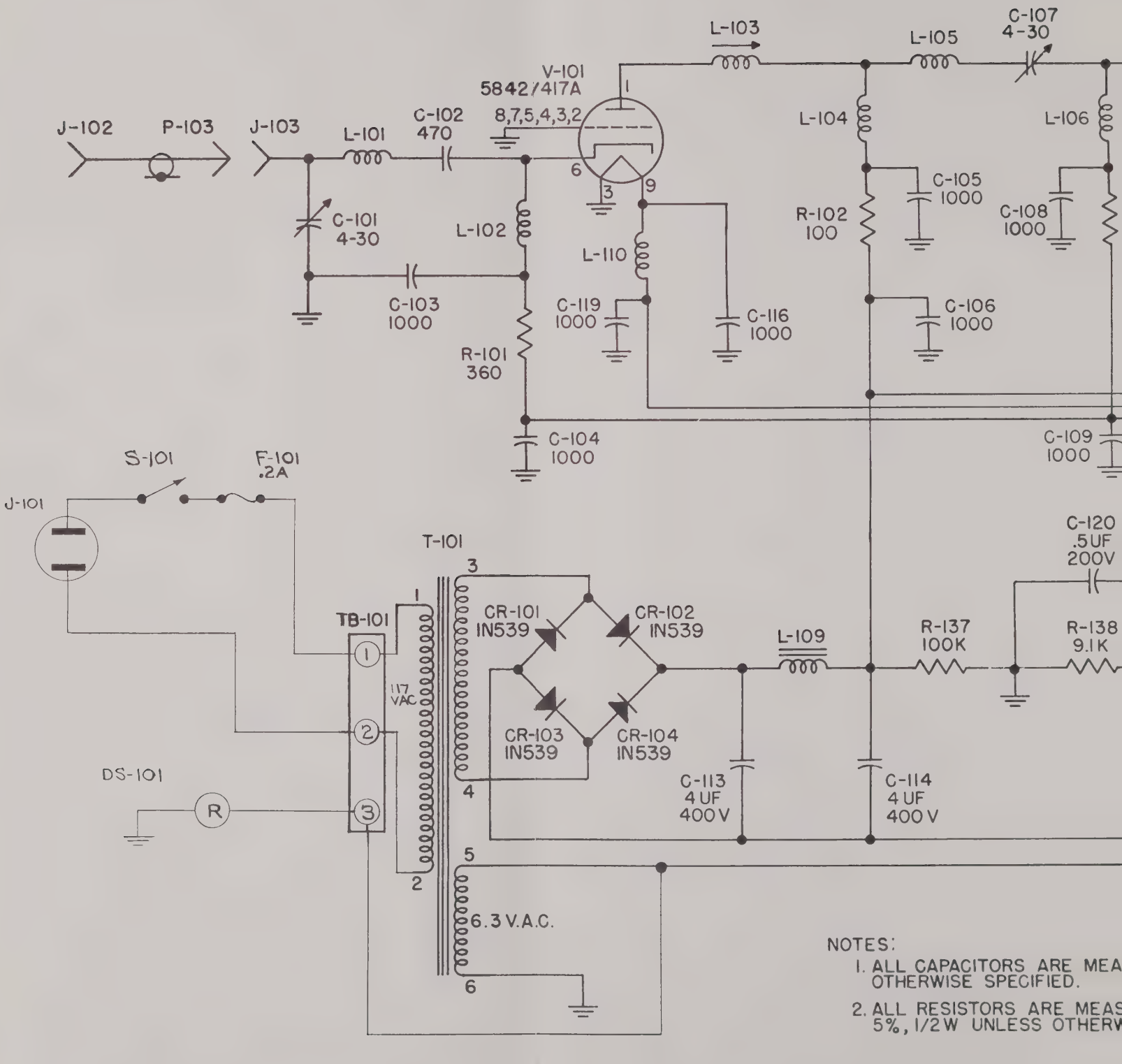
REF. SYMBOL NO.	NAME OF PART & DESCRIPTION
P-110	Same as P-103
P-111	Same as P-103
P-112	Same as P-102
P-113	Same as P-102
P-114	Same as P-102
P-115	Same as P-102
P-116	Same as P-102
P-117	Same as P-102
P-118	Same as P-102
P-119	Same as P-102
R-101	RESISTOR, FIXED COMPOSITION: 360 ohms, ±5%, 1/2W, Allen Bradley RC20GF361J
R-102	RESISTOR, FIXED COMPOSITION: 100 ohms, ±5%, 1/2W, Allen Bradley RC20GF101J
R-103	Same as R-101
R-104	Same as R-102
R-105	RESISTOR, FIXED COMPOSITION: 68 ohms, ±5%, 1/2W, Allen Bradley RC20GF680J
R-106	Same as R-105
R-107	RESISTOR, FIXED COMPOSITION: 120 ohms, ±5%, 1/2W, Allen Bradley RC20GF121J
R-108	RESISTOR, FIXED COMPOSITION: 91 ohms, ±5%, 1/2W, Allen Bradley RC20GF910J
R-109	Same as R-105
R-110	Same as R-105
R-111	Same as R-107
R-112	Same as R-108
R-113	Same as R-105
R-114	Same as R-105
R-115	Same as R-107
R-116	Same as R-108
R-117	Same as R-105
R-118	Same as R-105
R-119	Same as R-107
R-120	Same as R-108
R-121	Same as R-105
R-122	Same as R-105
R-123	Same as R-107

SECTION VII

MAINTENANCE PARTS LIST

MC-406

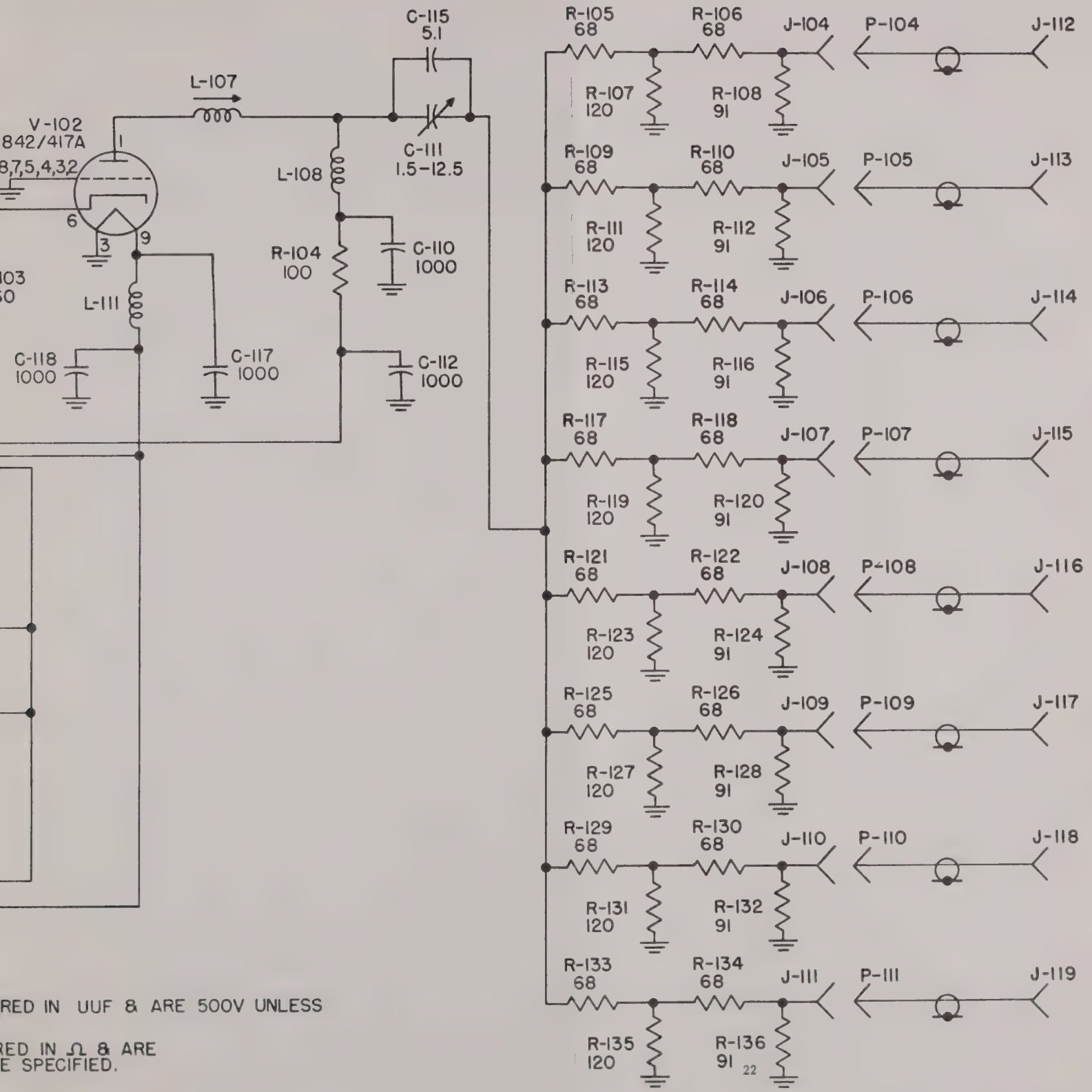
REF. SYMBOL NO.	NAME OF PART & DESCRIPTION
R-124	Same as R-108
R-125	Same as R-105
R-126	Same as R-105
R-127	Same as R-107
R-128	Same as R-108
R-129	Same as R-105
R-130	Same as R-105
R-131	Same as R-107
R-132	Same as R-108
R-133	Same as R-105
R-134	Same as R-105
R-135	Same as R-107
R-136	Same as R-108
R-137	RESISTOR, FIXED COMPOSITION: 100,000 Ω, 5%, 1/2W, Allen Bradley RC20GF104J
R-138	RESISTOR, FIXED COMPOSITION: 9.1K, 5%, 1/2W, Allen Bradley RC20GF912J
S-101	SWITCH: toggle, SPST H.H. Smith #520
T-101	TRANSFORMER, power, 117V AC per NEMS-CLARKE DWG. #AB-19,880
TB-101	TERMINAL STRIP: barrier type, 3 section, Cinch-Jones 3-140-Y
V-101	TUBE, ELECTRON: 5842/417A Western Electric per MIL-E-1
V-102	Same as V-101
XDS-101	PILOT LAMP: Assembly Dialco 81410-111
XF-101	FUSEHOLDER: Bakelite 3AF fuse, Bussman HKP
XV-101	SOCKET: electron tube Mycalex 90A299
XV-102	Same as XV-101



NOTES:

1. ALL CAPACITORS ARE MEA
OTHERWISE SPECIFIED.

2. ALL RESISTORS ARE MEAS
5%, 1/2W UNLESS OTHERW



D-50481

Figure 7-1. Schematic Diagram, RF Multicoupler, Model MC-406